

CLAIMS

We claim:

1. A method of maintaining milk production in a dairy cow fed a low phosphorus diet, comprising the steps of:

feeding a feed that contains about 0.3% by weight or less of an inorganic phosphorus supplement to a dairy cow; and

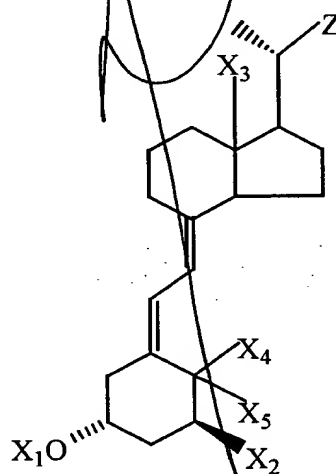
5 feeding with said feed an effective amount of a 1α -hydroxylated vitamin D compound for increasing phosphorus uptake in the cow's gut.

2. The method of claim 1 wherein said 1α -hydroxylated vitamin D compound is fed as a top dressing on said feed.

3. The method of claim 1 wherein said effective amount of the 1α -hydroxylated vitamin D compound comprises about $0.1\mu\text{g/kg}$ to about $100\mu\text{g/kg}$ of diet.

4. The method of claim 1 wherein the feed contains 0% by weight of an inorganic phosphorus supplement.

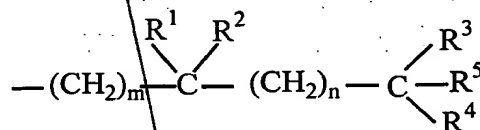
5. The method of claim 1 wherein said 1α -hydroxylated vitamin D compound is characterized by the following general structure:



5 where X_1 may be hydrogen or a hydroxy-protecting group, X_2 may be hydroxy, or protected hydroxy, X_3 may be hydrogen or methyl, X_4 and X_5 each represent

hydrogen or taken together X_4 and X_5 represent a methylene group, and where Z is selected from Y, -OY, -CH₂OY, -C≡CY and -CH=CHY, where the double bond may have the cis or trans stereochemical configuration, and where Y is selected

10 from hydrogen, methyl, -CR₅O and a radical of the structure:



where m and n, independently, represent integers from 0 to 5, where R¹ is selected from hydrogen, hydroxy, protected-hydroxy, fluoro, trifluoromethyl, and C₁₋₅-alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or

15 protected-hydroxy substituent, and where each of R², R³ and R⁴, independently, is selected from hydrogen, fluoro, trifluoromethyl and C₁₋₅ alkyl, which may be straight-chain or branched, and optionally bear a hydroxy or protected-hydroxy substituent, and where R¹ and R², taken together, represent an oxo group, or an alkylidene group, =CR₂R₃, or the group -(CH₂)_p-, where p is an integer from 2 to 5, and where R³ and R⁴, taken together, represent an oxo group, or the group

20 -(CH₂)_q-, where q is an integer from 2 to 5, and where R⁵ represents hydrogen, hydroxy, protected-hydroxy, or C₁₋₅ alkyl.

6. The method of claim 1 wherein the vitamin D compound is 1α-hydroxyvitamin D₃.

7. The method of claim 1 wherein the vitamin D compound is 1α,25-dihydroxyvitamin D₃.